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# PATENT SPECIFICATION

(11) 1281084

## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN AND RELATING TO HATCH ASSEMBLIES FOR VEHICLES

(71) We, HELIO MIRROR COMPANY LIMITED, a British Company, of Crabtree Manorway, Belvedere, Kent, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with improvements in and relating to hatch assemblies for vehicles, and more particularly, but not exclusively, to hatch assemblies for commanders cupolas in tank turrets.

It has been proposed to close the commander's hatch of a tank by a hatch cover which has two positions, closed and open, the first being the position in which the hatch rim seats upon the rim of the hatch and the cover seals the hatch and the second being a position in which the cover is at an angle usually greater than 90° to the plane in which the hatch rim lies so that free passage is available through the hatch.

According to the present invention, there is provided a hatch assembly for vehicles comprising a cover member pivotally mounted about a first axis on supporting means which is pivotally mounted on a member defining a hatch-way about a second axis parallel to the first, the cover member being pivotable about said first axis relative to the supporting means between first and second positions and being movable relative to the hatchway by pivoting of the support means about said second axis, whereby the cover member is movable between a closed position in which the cover member is in the said first position relative to the supporting means and seats on the margin of the hatch-way, an umbrella position in which the cover member is in the said second position relative to the supporting means and is located over the hatch-way but spaced from the margin defining the hatch-way and is in the same attitude relative to the margin as in the closed position, and an open position allowing access to the hatch-way.

One embodiment of the invention will now be described by way of example only, reference being had to the accompanying drawings in which:

Figures 1, 2, 3 and 4 show diagrammatically the four positions of a hatch cover relative to a hatch set in a tank commander's cupola;

Figure 5 is a plan view of the cover from which the stop dog and links have been omitted;

Figure 6 is a rear view of the cover with one half of the hinge bracket omitted;

Figure 7 is an underneath view of the cover showing the bolt operating mechanism;

Figure 8 is a detail view of a cover locking mechanism for use in the umbrella position;

Figure 9 is a section through the locking block with the cover in the first open and second open positions, and

Figure 10 is a section through the cover locking hatch.

Referring to Figures 1 to 4 a tank commander's cupola 1, which may be of any suitable form, defines a hatch through which access may be had to the interior of the turret. To close the hatch there is provided a cover 2, pivotally supported on opposite sides at 3 by a pair of arms 4, pivoted on a bracket 5.

The cover is movable between four positions:

(a) a closed position shown in Figure 1 in which the cover seats upon the margin of the hatch and seals the hatch, the commander then having to resort to his periscopes for vision.

(b) an umbrella position shown in Figure 2 in which the attitude of the cover to the hatch is the same as in the closed position but the cover is spaced from the hatch, thus giving the commander a direct view of his surroundings but still giving a large degree of physical protection to him and against entry of hostile material into the turret.

(c) a first open position shown at Figure

3 in which the cover is clear of the hatch but can still be readily closed and finally,

(d) a second open position in which the cover approaches the horizontal.

- 5 In the first open position the cover may be at an angle of more than  $90^\circ$  to the plane of the margins of the hatch and in the second open position the cover may be at an angle of between  $135^\circ$  and  $180^\circ$  to the plane of the margin of the hatch.

- 10 Between the closed and the umbrella positions the cover is moved about its pivots 3 and to hold the cover in the closed or umbrella position a bolt is provided on each side of the cover, and each arm has two bolt holes 6. Thus the cover can be locked relative to the arms in each of the two attitudes of the cover relative to the arms required for the closed and the umbrella positions.

- 20 Considering the cover construction now in greater detail and referring to Figures 5, 6 and 7, the cover is concave on the underface 10, has a pair of spaced exterior bosses 11, each having a bore 12 for a locking bolt 13, (Figure 7), has a rectangular section bolt lever passage 14 communicating between each bore 12 and the underface 10 and has a latch bore 15 opening to the exterior between the bosses 11, the bore including a step 16 adjacent the inner end.

- 30 Each locking bolt 13 is biased outwardly by a spring 17 and engages one of the bolt holes 6 of an arm 4. Through the bolt lever passages 14 extend bolt extractor levers 18, 19 pivoted at 20, 21 and coupled together by a rod 22 pivotally connected to each lever. One lever, 19 projects beyond its pivot axis in the form of a handle 23 whereby the commander can simultaneously retract the bolts to adjust the cover about the pivots 3 and hence the attitude of the cover relative to the arms which are fast relative to one another.

- 40 To hold the cover in position relative to the hatch in the 'umbrella' position, a latch 30 (Figure 8) is pivoted to the cover at 31. This latch comprises an element 32 having a flange 33 which, in the umbrella position, engages a recess 34 in the margin of the hatch. To hold the latch with the flange thus engaged, a spindle 35, biased inwardly of a bore 36 in the element 32 and pierced by a peg 37, is moved outwardly of the bore to engage the peg behind fingers 38 of a locking plate 39 on the hatch. Similar fingers 40 are provided on the cover to hold the element 32 in a stowed condition when not required (shown in chain dot lines). For manipulating, a finger ring 41 is provided on the spindle.

- 60 The arms 4 are carried by a spindle 50 which is rotatable in cover bracket 5 which comprises a base 52, two spindle bearing members 53 and a cover latching block 54 (Figure 9). This latching block includes an upper stop 55, a second open position latch

stop 56 and a bore 57. The bore receives a pin 58 pivotally anchoring a pair of links 59 which in turn are pivotally coupled to a stop dog 60. Stop dog 60 includes a recess 61 for engagement with the upper stop 55 and a first open position latch stop 62, lift lugs 63 and dog stops 64.

When the cover is to be positioned in the first open position, the links 59 and stop dog 60 are positioned as shown in full lines in Figure 9. As the cover arms carry the cover toward the first open position from the closed attitude of the cover, a cover latch 65, projecting from latch bore 15 and biased outwardly by a spring 66 bearing on the latch and on bore step 16, strikes a striker surface 67 of latch stop 62 on the stop dog and is forced into the latch bore until the free edge of the latch passes the top edge of stop 62. At that point the latch is spring urged outwardly of its passage to engage behind stop 62 and surface 68 on the cover rim abuts face 69a on the stop dog. Should the cover be swung up to the first open position from the umbrella attitude to the arms, ears 63a on the cover rim will strike the lift lugs 63 and move the stop dog off the block 54 so that there is no danger of the cover jamming.

To move the cover to the second open position it is swung toward the closed position after withdrawing the latch 65 by means of a handle 70 fast with a spindle 71 carried by the cover. On spindle 71 is mounted a tongue 72 engaging a bell crank 73 itself engaging the latch. The links 59 and stop dog 60 can now be swung clear of the latching block 54 until the links rest on a stop 59a. Dog stops 64 will prevent the dog dropping and striking a cupola periscope. The cover can now be swung over the block until the latch 65 reaches the second open position latch stop 56 where it will engage. In this position the surface 68 rests upon the face 69 of the latch block 54.

To return the cover to the first open position the latch 65 is retracted, the cover raised, the stop dog repositioned on the block 54 and the latch re-engaged with the stop dog.

To assist the commander to move the cover suitable balancing springs are provided but these are not shown, nor is there shown such padding as may be desired on the internal surface of the cover. Likewise any desired arrangements for locking the cover from the outside may be provided but have not been shown or described since they form no part of this invention.

#### WHAT WE CLAIM IS:—

1. A hatch assembly for vehicles comprising a cover member pivotally mounted about a first axis on supporting means which is pivotally mounted on a member defining a hatch-way about a second axis parallel to the first, the cover member being pivotable about

said first axis relative to the supporting means hatch-way defining member for retaining the cover member in its open position.

6. A hatch assembly as claimed in claim 5, wherein the last mentioned retaining means comprises a spring biased latch mounted on the cover member and engageable with a stop member mounted on the hatch-way defining member, the latch being manually disengageable from the stop member.

7. A hatch assembly as claimed in any of claims 1 to 6, wherein the cover member is movable between four positions, the closed position, the umbrella position and first and second open positions.

8. A hatch assembly as claimed in claim 7, wherein in the first open position the cover member is at an angle greater than  $90^\circ$  to the plane of the margin of the hatch-way and in the second open position the cover member is at an angle of between  $135^\circ$  and  $190^\circ$  to the plane of the margin of the hatch-way and provides an outside seat.

9. A hatch assembly as claimed in either of claims 7 or 8, wherein two stop members are provided on the hatch defining member, the latch being engageable with either of the stop members for retaining the cover member in either of the two open positions.

10. A hatch assembly for vehicles substantially as herein described with reference to the accompanying drawings.

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FIG. 1.

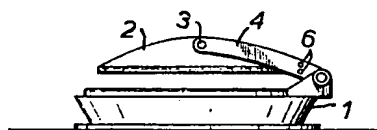


FIG. 2.

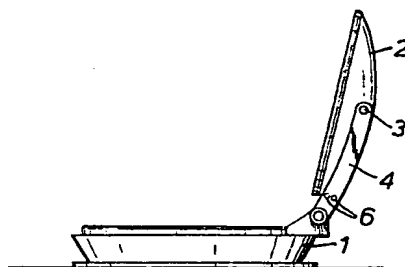


FIG. 3.

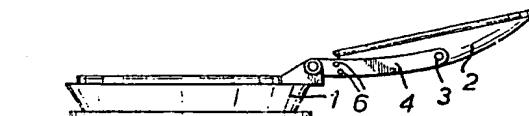
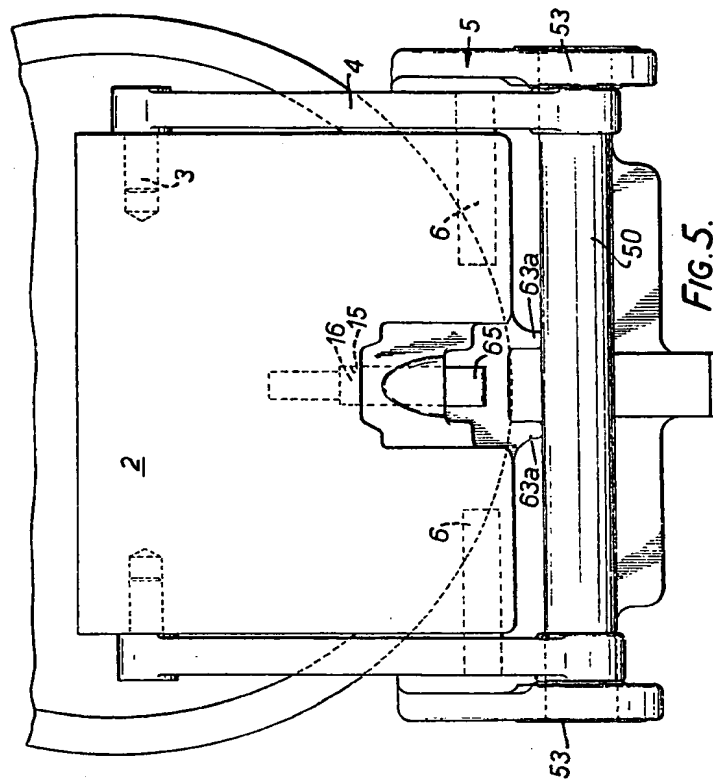


FIG. 4.

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**Sheet 2**



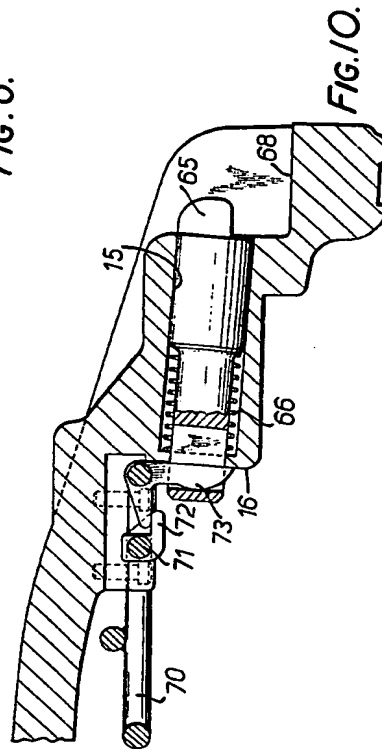
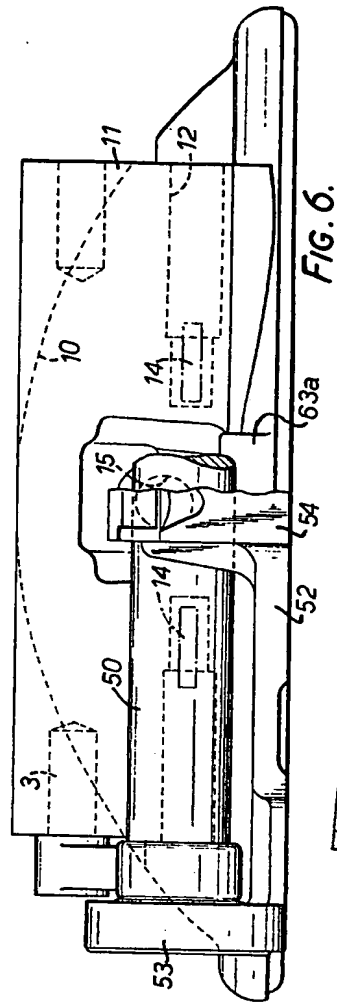
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